POPULATION GROWTH, AGRICULTURAL OUTPUT AND ECONOMIC GROWTH OF NIGERIA: A COINTEGRATION APPROACH (1981- 2015)

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Abstract

This research work investigates the relationship between Agricultural productivity, Population growth and Economic growth of Nigeria for the period, 1981-2015.This study employed ADF Unit root tests to check for stationarity. Johansen Co-integration tests were employed to test for long-run relationships among the dependent variable and the explanatory variables and finally, a Granger Causality test was conducted to identify if a causal relationships exist between the variables. The research reveals that there is a unidirectional causality runs from AGRO to GDP. It also shows that causality runs from AGRO to GEXA and POP to AGRO but not otherwise. There is a bi-directional causality between GEXA and GDP. Equally, causality runs from POP to GDP. Also causality runs from POP to GEXA but not otherwise. The co-integration tests result reveal that there is a long-run relationship among the variables included in the model. The findings imply that agricultural output has a positive and significant impact on economic growth in Nigeria. This indicates that agricultural output is a significant determinant of economic growth in Nigeria. Government expenditure on agriculture also has a positive effect on economic growth in Nigeria. Population growth affects economic growth negatively. The study recommends that efforts should be made to harness the increasing population and make them available into agricultural productivity so as to improve food production and sufficiency in Nigeria. Also, attention should be given to agriculture by increasing government expenditure on agriculture as it plays an important role in economic growth of Nigeria. This could be done through agricultural research programmes and youth orientation into agriculture.

Keywords: Economic Growth, Population Growth, Government Expenditure, Agricultural Output.

1. Introduction

Agriculture is the most important single activity in Nigerian economy with about 70% of the total workforce actively engaged in it (Ijirshar, 2015). Agriculture has been the backbone of the economy of Nigeria providing employment and source of livelihood for the increasing population. It also accounts for over half of the GDP of the Nigerian economy as at independence in 1960 (Izuchukwu, 2011). Statistical evidence shows that in the 1960s, agriculture contributed up to 64% to the total GDP but gradually declined in the 70s to 48% and it continued in 1980 to 20% and 19% in 1985, this was as a result of a structural shift from agriculture to oil. But recently, agricultural activities has increased, contributing about 25.38% of GDP in 1995-2005 and in 2006-2015 its contribution to GDP slightly decreased to 23.11% (CBN, 2015). The increase in agricultural output could be attributed to the diversification campaign pursued by successive Nigerian government since the oil crash of the 1980s. The campaign pursued include policies and programmes such as; Farm Settlement Scheme, National Accelerated Food Production Programme (NAFPP), Agricultural Development Projects (ADPs), River Basin Development Authorities (RBDAs), Nigerian Agricultural, Cooperation and Rural Development Bank (NACRDB), Operation Feed the Nation (OFN), Green Revolution Programme, Directorate of Foods, Roads and Rural Infrastructures (DFFRI), and Agricultural Credit Guarantee Scheme Fund (ACGSF). These programmes were all aimed at increasing agricultural contribution to the overall GDP. In spite of the policies and programmes on agriculture, the contribution of agriculture to GDP is still low.

This study is anchored on Robert Malthus' theory to test its veracity that population increase is detrimental to a nation's economy. The Malthus theory is premised on the fact that food production increases at an arithmetic rate whereas population grows with a geometric speed and thus questioned the ability of food production to keep pace with the demand of a faster growing population. In support of the theory, Thuku, Gachanja and Almadi (2013) asserts, “population growth does not have any impact on economic growth” (as cited in Abu, Okwori, Ajegi & Ochinyabo, 2015, p.28). This assertion has

been greatly criticized based on the fact that the Malthus hypothesis neglects the effect of technological change which brings about increase in agricultural productivity in the industrialized countries. However, there are still claims of the Malthusian hypothesis being present in the developing world.

The Nigerian population currently stands at 190million persons and is projected to grow at an annual rate of 3% (NBS, 2016). Nigeria is regarded as the most populated country in Africa and 10th most populated in the world. Rapid population growth has the tendency of increasing unemployment, inducing pressure on resources and social amenities, decreasing peasant income accompanied by widespread poverty among the rural dwellers, and incessant food shortages as a result of diminishing returns on agricultural land productivity. Hence, if not properly controlled could lead to the poverty trap and make true the Malthusian claim. Obviously, we cannot hope to come close to realizing the dream of a sustainable development with the present economic thrust, which places misguided confidence on a deformed and parasitic private sector and irrational total dependence on the oil sector as the prime mover of the economy and engine of growth (Nwosu, Dike, and Okwara, 2014).

Economic growth is the increase overtime of an economy's capacity to produce those goods and services needed to improve the well-being of the citizens in increasing numbers and diversity. According to Todaro and Smith (2006), it is the steady process through which the productive capacity of the economy is increased over time, to bring about rising level of national income. It can be discerned from these definitions that growth in turn leads to increase in national income. Growth is also seen as meaningful if there is an improvement in the well-being of the populace overtime; which can be possible if the rate of population growth lags behind that of economic growth. Economic Growth is conventionally measured as the rate of increase in Gross Domestic Product (GDP) usually calculated in real terms (netting out the effect of inflation on the price of the goods and services product).

This research is borne out of the convention that Nigeria as one of the most populous countries in Africa is expected to use advantage of its population to enhance economic growth through agricultural productivity. Thus this study tends to investigate the relationship between population growth, agricultural output and economic growth in Nigeria. This work tries to find answers to the following questions: 1.What is the effect of agricultural productivity on economic growth in Nigeria? 2. Does population growth have any effect on

economic growth in Nigeria? 3. What is the relationship between population growth and agricultural output in Nigeria? Therefore, the study aims to: determine the effect of agricultural productivity on economic growth in Nigeria; determine the effect of population growth on economic growth of Nigeria and determine if there is a significant relationship between population growth and agricultural output in Nigeria.

2. Review of Related Literature

The study reviewed some of the related empirical literatures such as: Olajide, Akinlabi and Tijani, (2012) that analyzed the relationship between agricultural resource and economic growth in Nigeria using the Ordinary Least Square regression method. The results reveal a positive cause and effect relationship between gross domestic product (GDP) and agricultural output in Nigeria. Agricultural sector is estimated to contribute 34.4 percent variation in gross domestic product (GDP) between 1970 and 2010 in Nigeria. The Agricultural sector suffered neglect during the hey-days of the oil boom in the 1970s. The study recommended that to improve agriculture, government should see that special incentives are given to farmers, provide adequate funding, and also provide infrastructural facilities such as good roads, pipe borne water and electricity. This study omitted population as a variable and mainly considered the determinants of agricultural output.

Odetola and Etumnu (2013) investigated the contribution of the agricultural sector to economic growth in Nigeria using the growth accounting framework and time series data from 1960 to 2011. The study finds that the agriculture sector has contributed positively and consistently to economic growth in Nigeria, reaffirming the sector's importance in the economy. The contribution of agriculture to economic growth is further affirmed from a causality test which showed that agriculture growth Granger-causes GDP growth, however no reverse relationship was found. The study noted that the resilient nature of the sector is evident in its ability to recover more quickly than other sectors from shocks resulting from disruptive events e.g. civil war (1967-70) and economic recession (1981-85) periods. The study also finds that the crop production subsector contributes most to the sector's growth and that growth in the agriculture sector is overly dependent on growth of the crop production subsector. This study looked at the agricultural sub-sectors, and excluded population as a variable and also the study data series was 1960-2011.

Ishola, Olaleye, Ajayi and Femi, (2013) explored the average contributions of the agricultural sector to the national earning of Nigeria over the years, using a time series data from 1981 to 2010 sourced from the Central Bank of Nigeria. The paper applied the unit root test and co-integration, relying on the theoretical backing posited by Solow. The study found that a significant relationship exists between government expenditure in agricultural sector and the economic growth of Nigeria.

In their own study, Chukwuma and Uju (2013) aimed at answering the question, 'Does agriculture matter for economic development in Nigeria?' The study modeled Life expectancy against agricultural output and agricultural expenditure, among other variables. Agricultural output is also modeled against a host of socio-economic, natural and human factors, which influence agricultural productivity. Applying Augmented Dickey-Fuller unit root test, Ordinary Least Squares, and the Newey-West method on secondary data and dummy variable used in the study, they found that agricultural output has negative and significant impact on life expectancy in Nigeria. The impact of agricultural expenditure was found to be positive but insignificant. Real gross domestic product and industrial output were also found to influence life expectancy. Careful examination of the hypothesized socio-economic factors (political instability and industrial output), natural factor (rainfall), and human factor (carbon emission) showed that only industrial output and rainfall matter for agricultural output in the country: both variables have positive impacts on agricultural output. The study submitted that as much as agriculture may matter for economic development, reliance on the sector alone without corresponding and simultaneous development of other crucial sectors such as education, health, and industry will not yield positive fruits for economic development in Nigeria.

Ebere and Osundina (2014) examined the impact of government expenditure on agriculture on economic growth in Nigeria over the years with time series data of 33 years sourced from the Central Bank of Nigeria. Ordinary Least Square (OLS) technique of data analysis was used in evaluating the secondary data. GDP was used as a proxy for economic growth, while agricultural output and government expenditure on agriculture were used as indicators of government expenditure on agriculture. From the findings, agricultural output, government expenditure and GDP are positively related. It was found that a significant relationship exist between government expenditure in the

agricultural sector and the economic growth in Nigeria.

Oyinbo and Rekwot (2014a) provided empirical information on the relationship between agricultural production and the growth of Nigerian economy with focus on poverty reduction. Time series data were employed in this research and the analyses of the data were done using unit root tests and the bounds (ARDL) testing approach to co-integration. The result indicates that agricultural production was significant in influencing the favourable trend of economic growth in Nigeria. The study notes that despite the growth of the Nigerian economy, poverty is still on the increase and this calls for a shift from monolithic oil-based economy to a more plural one with agriculture being the lead sector.

Yusuf (2014) explored empirically the role of agriculture in development of Nigeria (between 1981 and 2012) with the adaptation of the Solow Growth model using the Restricted Error Correction Model. The study reveals that the Agriculture plays a significant role in economic development of the nation. In addition, the sector has been neglected to the extent that its contribution to the GDP has been dwindling since 90's.

Matthew and Mordecai (2016) examined the impact of agricultural output on economic development in Nigeria using annual time series data spanning 1986 to 2014. Economic development proxy by per capita income (PCI) was explained by agricultural output (AOUT) and public agricultural expenditure (PXA). The study employed the Augmented Dickey-Fuller Unit Root test and the Vector Autoregressive model. The result of the multivariate VAR model indicated that most of the lags of the variables are not significant. However, the high level of the R^2 and F value in the VAR regression estimates for PCI gave convincing results that collectively all the lagged terms are statistically significant, implying that agriculture plays an important role in Nigeria's economic development.

In a study of "The Role of Population on Economic Growth and Development: Evidence from Developing Countries" Atanda, Aminu and Alimi (2012) examined the comparative trend review of population growth determinants between developing countries (Bangladesh, Ethiopia, Indonesia, Mexico and Nigeria) and developed nations (Germany and United States). The trend analysis revealed that fertility rate, crude death rate, birth rate, mortality rate, and life expectancy are the major determinants of rapid population growth rate, while youth dependency ratio of young people below age 15 has also

been attributed as one of the leading causes of population growth and growth threat in developing countries. The analysis further indicated that excluding Mexico from the Upper Middle Income group, developed economies (United State and Germany) with large population size have a higher real economic well-being as measured by the Real GNI per capita, compared with selected developing economies in the world.

Abu, et al (2015) investigated the potency of increasing population on economic development in Nigeria hinging the background of analysis on Malthusian population theory. Using the Vector Error Correction (VEC) Mechanism to estimate a time series covering a 31 year period of 1982 – 2012, the study found out that population growth has no significant impact on economic development in Nigeria – giving credence to the theoretical underpinning.

Onwuka (2006) empirically tested the association between population growth and economic development in Nigeria between 1980 and 2003 and found that growth in population outweighs that of output and this has hindered the capacity of successive governments to efficiently provide social services to the people, thereby negatively affecting development.

Adewole (2012) examined the effect of population on economic development in Nigeria. The study used trend analysis of the study with the scope spanning between 1981 and 2007 and also adopted ordinary least square method of analysis. The study revealed that population growth has positive and significant impact on economic sustainability proxy as real gross domestic product (RGDP) and Per Capita Income.

Eli, Mohammed and Amade (2015) evaluated the impact of population growth on economic growth in Nigeria (1980-2010). The result revealed that there is a positive relationship between economic growth (proxy by GDP growth) and population, fertility and export growth; while negative relationships were found between economic growth (proxy by GDP growth) and life expectancy, and crude death rate.

Nwosu, et al (2014) investigated the role of population growth on economic growth of Nigeria and how economic growth is effected through population growth. The Empirical result supports that population growth has a significant impact on economic growth. The study also found that there is a sustainable long run equilibrium relationship between economic growth and population growth.

Most of the works reviewed ignored the population as a variable and where used did not use VECM as a method. Equally, some never applied Granger Causality in their tests, while some also applied wrong estimation procedures, hence the need for the study.

3. RESEARCH METHODOLOGY

3.1 Model Specification

This study generates its theoretical framework from the basic knowledge of the Harrod-Domar growth model as applied by Blanchard and Johnson (2012). Therefore, in attempt to capture the effect of population growth and agricultural output on economic growth, we adopted the following model;

$GDP_t=f(AGRO_t,GEXA_t,POP_t)$…..1

Econometrically, equation 3.1 above is specified as;

$GDP_t=â_1+â_2AGRO_t+â_3GEXA_t+â_4POP_t+å$ 2

Where GDP_t is the gross domestic product which is used as a proxy for economic growth (Eli, Mohammed and Amade ,2015) at time t, $AGRO_t$ is the agricultural output in Nigeria at time t,$GEXA_t$ is the government expenditure on agriculture at time t, POP_t is the population of Nigeria at time t, while å is the error or disturbance term while â's are the parameters to be estimated.

Nature and Source of Data

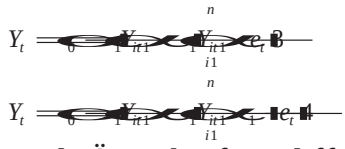
In carrying out this study, the use of time series data got from the CBN Statistical Bulletin (2010, 2013, and 2015) and National Population Commission (1999, 2006, and 2015) for the period of 35 years from 1981 to 2015 isemployed.

Method of Data Analysis

This study employed ADF Unit root tests to check for stationarity. Johansen Co-integration tests were employed to test for long-run relationships among the dependent variable and the explanatory variables and finally, a Granger Causality test was conducted to identify if a causal relationships exist between the variables.

Estimation Techniques

The general form of ADF test is estimated by the following regression:



Where: Y is a time series, t is a linear time trend, Ä is the first difference operator, $á_0$ is a constant, n is the optimum number of lags in the dependent variable and e is the random error term. The difference between equation (3) and (4) is that the first equation includes just drift. However, the second equation includes both drift and linear time trend.

The null hypothesis is that $á_1 = 0$. If the null hypothesis $á_1 = 1$, then we conclude that the series under consideration $Ä(y_t)$ has unit root and is therefore non-stationary.

If the ADF test fails to reject the test in levels but rejects the test in first differences, then the series contains one unit root and is of integrated order one 1(1). If the test fails to reject the test in levels and first differences but rejects the test in second differences, then the series contains two unit roots and is of integrated order two 1(2).

VAR Co-integration Test

The result of the integration test was pursued by co-integration tests. The existence of long-run equilibrium (stationary) relationships among economic variables is referred to in the literature as co-integration. The Johansen procedure was employed to examine the question of co-integration. It provides not only an estimation methodology but also explicit procedures for testing for the number of co-integrating vectors as well as for restrictions suggested by economic theory in a multivariate setting. Engel and Granger (1987) pointed out that a linear combination of two or more non-stationary variables may be stationary if such a stationary combination exists. If such a stationary combination exists then the non-stationary time series are said to be co-integrated. The VAR based co-integration test using the methodology developed in Johansen (1991, 1995) was employed. Johansen's methodology takes its starting point in the vector Auto Regressive (VAR) of order P given by

Where:

Y_t is an n x 1 vector of variables that are integrated of order commonly denoted (1) and $_t$ is an nx1 vector of innovations.

This VAR can be rewritten as

$$Y_t = \sum_{i=1}^{p-1} y_{t-1} - {}_i y_{t-1} - {}_t C$$

where

$$A_{i-1} \text{ and } {}_i \quad \sum_{j=i+1}^{p} Aj$$

VAR and Granger-Causality Test

Granger causality test was conducted to determine whether the current and lagged values of one variable affect another. One implication of Granger representation theorem is that if two variables, say Y_t and X_t are co-integrated and each is individually 1(1), then either X_t must Granger-cause Y_t or Y_t must Granger-cause X_t. This causality of co-integrated variables is captured in Vector Error Correction Model (VECM). In a VECM long and short-run parameters are separated. In the present study linear combinations of non-stationary variables some were found stationary, that is, some of the variables are co-integrated. In the presence of co-integration the restricted VAR in first difference is estimated, which take the following form:

$$Y_t = \sum_{i=1}^{n} b_{1t} Y_{t-1} - c_{1t} X_{t-1} - \sum_{i=1}^{n} d_{1t} Z_{t-1} - \sum_{i=1}^{n} e_{1t}$$

$$X_t = \sum_{i=1}^{n} b_{2t} Y_{t-1} - c_{2t} X_{t-1} - \sum_{i=1}^{n} d_{2t} Z_{t-1} - \sum_{i=1}^{n} e_{2t}$$

$$Z_t = \sum_{i=1}^{n} b_{3t} Y_{t-1} - c_{3t} X_{t-1} - \sum_{i=1}^{n} d_{3t} Z_{t-1} - \sum_{i=1}^{n} e_{3t}$$

Where Ä is the first difference operator, e_{1t}, e_{2t} and e_{3t} are random disturbances and n is the number of the optimum lag length, which is determined empirically by Schwarz criterion (SC). For each equation in the above VAR, Wald ^{2} statistic is used to test the joint significance of each of the other lagged endogenous variables in that equation. For $ÄY_t$ to be unaffected by $ÄX_t$ and $ÄZ_t$, $\sum c_{1t}$ and $\sum d_{1t}$ respectively must not be significantly different from zero. Similar logic applies to (X_t and Z_t

Granger-Causality Test: It is used to test for the long run relationship between the variables. And a long run relationship is found on these variables

in which we will study. According to Granger (1969), Y is said to "Granger-cause" X if and only if X is better predicted by using the past values of Y than by not doing so with the past values of X being used in either case. In short, if a scalar Y can help to forecast another scalar X, then we say that Y Granger-causes X. If Y causes X and X does not cause Y, it is said that unidirectional causality exists from Y to X. If Y does not cause X and X does not cause Y, then X and Y are statistically independent. If Y causes X and X causes Y, it is said that feedback exists between X and Y. Essentially, Granger's definition of causality is framed in terms of predictability.

A vector error correction (VEC) model is a restricted VAR that has co-integration in order with non-stationary series that are co-integrated. It restricts the long-run behavior of the explanatory variables to converge to their co-integration relationships while allowing a wide range of short-run dynamics (Sarte, 1997). VEC model is specified as:

$$y_{i,t} \quad u_i \qquad 7$$

where: y_i = change in individual variable in the model.

i

= parameters in the model.

$y_{it\ 1}$ = lagged variables in the model

u_i = Random innovations

= error correction parameter

ECM= Error correction term

(Davidson and Mackinnon 1993, Hamilton 1994, Sarte 1997)

4. Presentation and Analysis of Results

4.1 Unit Root Tests Results

The Augmented Dickey-Fuller (ADF) test is used to test the stationarity of the data.

Table.1: Augmented Dickey – Fuller Unit Root Test Result

Time series Variables	ADF(Intercept NO trend)	1% level	5% level	10% level	prob.*	Order of Integration
GDP	-4.083742	-3.653730	-2.957110	-2.617434	0.0034	1(1)
AGRO	-4.560498	-3.646342	-2.954021	-2.615817	0.0009	1(1)
GEXA	-7.104733	-3.653730	-2.957110	-2.617434	0.0000	1(1)
POP	-5.211099	-3.646342	-2.954021	-2.615817	0.0002	1(1)

Note: Mackinnon (1996) one sided p-value and critical value for rejection of hypothesis of unit root were applied.

All the variables were not stationary at levels. The unit root test, as shown in Table 1, conducted on the selected macro economic variables showed that the entire selected variables were stationary at first difference. Therefore, they are integrated of order one 1(1).The necessary but not sufficient condition for co-integration is that each of the variables must be integrated of the same order, where the order of integration must be greater than zero in absolute terms. Therefore, we proceeded to carry out co-integration test.

4.2 Co-integrationTest Result

A Co-integration test was carried out to ascertain if there is a long-run relationship between the variables in the model. This is examined by the use of Johansen Co-integration. It allows any variable in the model to be used as dependent variable while still maintaining the same Co-integration results. The Co-integration tests were done adopting the assumptions that allowed for No linear deterministic trend in data, no intercept or trend in Co-integrating equation and test VAR and Linear deterministic trend in data, no intercept or trend in co-integrating equation and test VAR. The results are presented in Tables 2a and 2b respectively below.

Table. 2a: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No .of CE (s)	Eigenvalue	Trace Statistic	0.05 Critical value	Prob. **
None *	0.796285	98.47114	40.17493	0.0000
At most1*	0.532086	45.96711	24.27596	0.0000
At most 2*	0.467848	20.90461	12.32090	0.0015
At most 3	0.002642	0.087316	4.129906	0.8082

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**Mackinnon-Haug-Michelis (1999) p-values

Table. 2b:Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No .of CE (s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical value	Prob.**
None *	0.796285	52.50403	24.15921	0.0000
At most1*	0.532086	25.06250	17.79730	0.0034
At most 2*	0.467848	20.81729	11.22480	0.0008
At most 3	0.002642	0.087316	4.129906	0.8082

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**Mackinnon-Haug-Michelis (1999) p-values

Tables 2a and 2b show that there are three co-integrating equations in both Trace and Maximum Eigenvalues. This implies that the variables under consideration are co-integrated. Hence there is a long run relationship among the selected economic variables. We, therefore present the result of VECM in Table 2c.

Table: 2c VECM Result

Variables	Co efficient	Std. Error	t. statistic
D(GDP(-1))	4.555283	0.66264	6.87448
D(DGP(-2))	-8559975	0.60419	-14.1676
D(POP(-1))	-19863062	7614211	-2. 60868
D(POP(-2))	13215755	7916164	1.66946
D(AGRO(-1))	-108.6420	36.6981	- 2.96043
D(AGRO(-2))	130.5583	34.3631	3.79938
D(GEXA(-1))	5751.938	1521. 51	3.78042
D(GEXA(-2))	3062.718	1332.35	2.29873
C	97705. 75	38195. 5	2.55804
ECM	- 1.125303	0.27455	-4.09868

	D(GDP)	D(POP)	D(AGRO)	D(GEXA)
R-squared	0.910566	0.223261	0.451754	0.540953
Adj. R-squared	0.873979	-0.094495	0.227471	0.353162
Sum sq. resids	9.98E+10	8.58E-05	4398398.	1601.369
S.E. equation	67351.85	0.001974	447.1322	8.531676
F-statistic	24.88787	0.702617	2.014216	2.880603
Log likelihood	-395.1769	159.8706	-234.7023	-108.0121
Akaike AIC	25.32355	-9.366910	15.29389	7.375755
Schwarz SC	25.78160	-8.908868	15.75193	7.833798
Mean dependent	-3642.944	0.003100	423.2231	1.289288
S.D. dependent	189726.6	0.001887	508.7196	10.60807

Determinant resid covariance (dof adj.)	1.77E+11
Determinant resid covariance	3.95E+10
Log likelihood	-572.0363
Akaike information criterion	38.50227
Schwarz criterion	40.51766

The result of VECM in Table 2c above shows that 90% of the changes in economic growth (GDP) can be attributed to changes in previous first and second years in the values of the explanatory variables. The agricultural output and the government expenditure on agriculture of last two years positively impact on the economic growth with coefficient of 130.5583 and 3062.718 respectively. The ECM (-) is right signed with -1.125303.

4.3 Granger Causality Test

Pairwise Granger Causality Tests
Sample: 1981 2015
La gs: 2
Table 3. Granger Causality Tests Result

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause AGRO	33	0.39541	0.6771
AGRO does not Granger Cause GDP		26. 9378	3. E-07
GEXA does not Granger Cause AGRO	33	0.04335	0.9576
AGRO does not Granger Cause GEXA		9.70346	0.0006
POP does not Granger Ca use AGRO	33	4.91558	0.0148
AGRO does not Granger Cause POP		1.05057	0.3631
GEXA does not Granger Cause GDP	33	3.63146	0.0396
GDP does not Granger Cause GEXA		6.09603	0.0063
POP does not Granger Ca use GDP	33	3.59599	0.0407
GDP does not Granger Cause POP		2.32239	0.1166
POP does not Granger Ca use GEXA	33	7.09791	0.0032
GEXA does not Granger Cause POP		0.10922	0.8969

The table 3 above presents the Pair-wise Granger Causality tests. It could be seen from the table that there is a unidirectional relationship between Agricultural Output (AGRO) and Gross Domestic Product (GDP), causality runs from AGRO to GDP, given that the F-statistic is 26.9378 and low probability value of 3.E-07 is less than 0.05. It could also be seen from the table that causality runs from AGRO to GEXA and from POP to AGRO but not otherwise. There is a bi-directional causality between GEXA and GDP with F-statistic values of 3.63146 and 6.09603, and probability values of 0.0396 and 0.0063 respectively. Equally, there is a unidirectional relationship between POP and GDP. Also causality runs from POP to GEXA but not otherwise.

5.0 Summary, Recommendations and Conclusion

This research work investigated the relationship between Agricultural productivity, Population growth and Economic growth in Nigeria for the period, 1981-2015.This study employed ADF Unit root tests to check for stationarity. Johansen Co-integration tests were employed to test for long-run

relationships among the variables and finally, a Granger Causality test was conducted to identify if a causal relationships exist between the variables. The research made the following findings: Agricultural output has a positive and significant impact on economic growth in Nigeria. This indicates that agricultural output is a significant determinant of economic growth in Nigeria. Government expenditure on agriculture also has a positive effect on economic growth in Nigeria. The co-integration tests result reveal that there is a long-run relationship among the variables included in the model. The finding reaffirms Robert Malthus theory and lends credence to the finding of Abu, et al (2015).

Based on the above findings, the following recommendations are made; Efforts should be made to harness the increasing population and make them available into agricultural productivity so as to improve food production and sufficiency in Nigeria. Attention should be given to agriculture by increasing government expenditure on agriculture as it plays an important role in economic growth of Nigeria. This could be done through agricultural research programmes and youth orientation into agriculture. In conclusion, therefore, efforts should be made to capture more Nigerians into agricultural productivity, enhance human capacity building in agriculture and ensure that expenditures on agriculture yield meaningful and positive effects on economic growth in Nigeria.

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